

REMARKS

Applicant requests reconsideration of the application in view of the foregoing amendments and the discussion that follows. The status of the claims as of this response is as follows: Claims 1-29 are pending. Claims 1, 7, 12, 14 and 16 have been amended herein and claim 3 has been canceled.

The Amendments

Claim 1 was amended to recite that the apparatus comprises an opening at a proximal end of said interior channel and a chamber at a distal end of said interior channel. Support therefor is in the specification, for example, Fig. 2 and page 19, lines 14-17. Claim 1 also now recites that the structural member is adjacent the distal end. Support therefor is in the specification, for example, Fig. 2 and page 19, lines 14-17. Claim 1 was also amended to recite that the dimensions of and placement of the structural member is sufficient such that intermittent application of centrifugal force to the interior causes movement of fluid between the interior channel and the chamber. Support therefor is in the specification, for example, page 32, lines 9-16. Claim 1 was also amended to provide for proper antecedent basis.

Claim 7 was amended in a manner similar to that for claim 1.

Claim 12 was amended to recite the step of generating intermittent centrifugal force to cause repetitive movement of fluid between the interior channel and the chamber sufficient to cause mixing of fluid by agitation. Support therefor is in the specification, for example, page 8, lines 10-11, and page 32, lines 9-16.

Claim 14 was amended in a manner similar to that for claim 12.

Claim 16 was amended to recite that a sample is introduced into an opening at a proximal end of a housing comprising a linear microarray of features for hybridizing to analytes in a sample where the housing has an interior with internal capillary dimensions, a mixing area separate from the linear array at a distal end of the housing and a structural member in the housing adjacent the distal end. Support therefor is in the specification, for example, page 21, lines 19-29, and page 32, lines 9-16. Claim 16 also now recites that during the incubation intermittent centrifugal force is generated to cause reciprocal movement of the fluid between the linear array and the mixing area such that the fluid is mixed by agitation.

Support therefor is in the specification, for example, page 8, lines 10-11, and page 32, lines 9-16.

Drawings

Applicant acknowledges the indication in the Office Action that the replacement drawings in the form of formal drawings to substitute for the informal drawings filed with the original specification have been accepted.

Rejection under 35 U.S.C. §112

Claims 1-29 were rejected under the second paragraph of the above code section as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant submits that the amendments to claims 1, 7 and 16 above obviate this ground of rejection.

Rejection under 35 U.S.C. §102/103

Claims 1-3, 12 and 13 were rejected under 35 U.S.C. 102(b) as being anticipated by, or in the alternative under 35 U.S.C. 103(a) as obvious over, Kellogg, *et al.* (US 2002/0097632) (Kellogg). The Office Action contends that Kellogg discloses an apparatus for mixing fluids, the apparatus comprising a housing (100) having an interior channel (201,202,203) with capillary dimensions; a structural member in the interior channel adjacent an end thereof, the dimensions of and placement of the structural member being sufficient such that intermittent application of centrifugal force to the interior causes movement of the fluid in the channel without exit thereof (referring to paragraphs [0039], [0046], [0047] [0048]); and a mechanism that intermittently generates centrifugal force on the interior of the housing to cause movement of the fluid in the channel without exit thereof (referring to paragraph [0054]). The Office Action argues further that Kellogg teaches that the channel of his apparatus may be coated to provide hydrophobic patches (referring to [0047] and [0048] of Kellogg).

Kellogg does not disclose or suggest an apparatus as claimed in claim 1. The present apparatus comprises an opening at a proximal end of the interior channel, a chamber at a distal end of the interior channel and a structural member adjacent the distal end. Kellogg's device does not possess or suggest these

features. The device of the reference has an opening into a chamber that serves to receive fluid from the opening and from a meandering capillary. Furthermore, Kellogg does not suggest a structural member in addition to a capillary junction, which is disclosed in the reference as a change from capillary dimensions to chamber dimensions [0019] and [0021]. Kellogg discloses only a capillary junction that is an enlargement or constriction in a fluid path, or a component having differential surface treatment of a capillary, e.g., hydrophilic to hydrophobic, or a combination of the above. With regard to the assertion that Kellogg discloses hydrophobic patches that would equate to Applicant's structural member, there is no indication in the reference as to where these patches might be positioned other than in the capillary.

Furthermore, Kellogg's disclosure would not suggest the organization of elements as found in the present device. Kellogg employs his device to achieve mixing by diffusion. Thus, fluids are introduced into chamber 202, from which they are moved into capillary 203 for a period of time to achieve mixing of the fluids by diffusion [0052]. Then, fluids are moved back into chamber 202 and, then, after a period of time, the fluids are moved back into capillary 203, again for a period of time to achieve mixing by diffusion. Kellogg goes into some detail on how one achieves mixing by diffusion and sets out equations for calculating time periods and the like to achieve diffusional mixing [0052].

On the other hand, the present apparatus is designed to introduce fluid into an opening at one end of an interior channel and intermittently to move the fluid between the interior channel and a chamber that is at an opposing end of the interior channel. The structural member is in the interior channel adjacent the chamber. Fluid is moved repetitively back and forth between the interior channel and the chamber to achieve mixing of the fluid by agitation, not by diffusion as in Kellogg. This is discussed in the specification at page 4, lines 22-29, and page 8, lines 10-11. Mixing by agitation in Applicant's invention is important because the fluid in Applicant's methods can become depleted of reactants near the features on the linear array because of binding of molecules to the features of the array. The organization of the elements in Applicant's apparatus is important to achieving mixing by agitation. Kellogg does not offer any information relevant to this since

Kellogg is concerned only with mixing by diffusion. Accordingly, Kellogg does not anticipate or suggest the apparatus of claim 1 of the present application.

Without acquiescing in the assertion in the Office Action, claim 2 is patentable over Kellogg at least because of its dependency ultimately from Claim 1, which is patentable over the reference as indicated above.

Claim 3 has been canceled, thereby rendering the rejection of claim 3 moot.

Claim 12 is not disclosed or suggested by the Kellogg reference. In the method of claim 12, intermittent centrifugal force is generated to cause repetitive movement of fluid between the interior channel and the chamber sufficient to cause mixing of fluid by agitation. As discussed above, Kellogg neither discloses nor suggests such a method.

Without acquiescing in the assertion in the Office Action, claim 13 is patentable over Kellogg at least because of its dependency from claim 12, which is patentable over the reference as indicated above.

Rejection under 35 U.S.C. §103

Claims 4-11 and 14-29 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kellogg in view of Chee, *et al.* (U.S. Patent No. 5,837,832) (Chee). The Office Action recognizes that Kellogg does not teach a linear microarray of biopolymer features. However, asserts the Office Action, Chee teaches forming a linear microarray of biopolymer features (see col. 1, lines 19-24; col. 2 lines 26-37). It would have been obvious to one of ordinary skill in the art, contends the Office Action, to have arranged the features of Kellogg in a linear microarray as taught by Chee to achieve the rapid and efficient detection capability explained by Chee in col. 7, lines 55-57.

Without acquiescing in the assertion in the Office Action, claims 4-6 are patentable over Kellogg and Chee at least because of their respective dependency from claim 1, which is patentable over the references as discussed above.

Neither Kellogg nor Chee, either individually or in combination, discloses or suggests an apparatus as claimed in claim 7. The present apparatus comprises an opening at a proximal end of the interior channel, a chamber at a distal end of the interior channel and a structural member adjacent the distal end. Kellogg's device does not possess or suggest these features. Kellogg is, therefore, deficient in that

regard and Chee does not cure this deficiency. The device of Kellogg has an opening into a chamber that serves to receive fluid from the opening and from a meandering capillary. Furthermore, Kellogg does not suggest a structural member in addition to a capillary junction. With regard to the assertion that Kellogg discloses hydrophobic patches that would equate to Applicant's structural member, there is no indication in the reference as to where these patches might be positioned other than in the capillary.

Furthermore, Kellogg's disclosure would not suggest the organization of elements as found in the present device. Kellogg employs his device to achieve mixing by diffusion as explained above with regard to claim 1. On the other hand, the present apparatus is designed to introduce fluid into an opening at one end of an interior channel and intermittently to move the fluid between the interior channel and a chamber that is at an opposing end of the interior channel. The structural member is in the interior channel adjacent the chamber. Fluid is moved repetitively back and forth between the interior channel and the chamber to achieve mixing of the fluid by agitation, not by diffusion as in Kellogg. The organization of the elements in Applicant's apparatus is important to achieving mixing by agitation. Kellogg does not offer any information relevant to this since Kellogg is concerned only with mixing by diffusion. Accordingly, Kellogg does not anticipate or suggest the apparatus of claim 7 of the present application and Chee is silent as to such elements and their organization in an apparatus. Accordingly, the combined teachings of Kellogg and Chee do not suggest the apparatus of claim 7 of the present application.

Without acquiescing in the arguments in the Office Action, claims 8-11 are patentable over Kellogg and Chee at least because of their respective dependency ultimately from claim 7, which is patentable over the reference as indicated above.

Claim 14 is not disclosed or suggested by the combined teachings of Kellogg and Chee. In the method of claim 14, intermittent centrifugal force is generated to cause repetitive movement of fluid between the interior channel and the chamber sufficient to cause mixing of fluid by agitation. As discussed above, Kellogg neither discloses nor suggests such a method. Kellogg is interested only in mixing by diffusion. Chee does not cure this deficiency of Kellogg.

Without acquiescing in the assertion in the Office Action, claim 15 is patentable over Kellogg and Chee at least because of its dependency from claim 14, which is patentable over the reference as indicated above.

The combined teachings of Kellogg and Chee do not disclose or suggest the method of present claim 16. As discussed above, Kellogg employs his device to achieve mixing by diffusion. Thus, fluids are introduced into chamber 202, from which they are moved into capillary 203 for a period of time to achieve mixing of the fluids by diffusion [0052]. Then, fluids are moved back into chamber 202 and, then, after a period of time, the fluids are moved back into capillary 203, again for a period of time to achieve mixing by diffusion. Kellogg goes into some detail on how one achieves mixing by diffusion and sets out equations for calculating time periods and the like to achieve diffusional mixing [0052].

On the other hand, in the present method fluid is introduced into an opening at one end of an interior of a housing comprising a linear microarray and intermittently moved between the interior and a mixing area that is at an opposing end of the interior of the housing where the opening is. The structural member is in the interior adjacent the mixing area. Fluid is moved repetitively back and forth between the linear microarray and the mixing area to achieve mixing of the fluid by agitation, not by diffusion as in Kellogg. This is discussed in the specification at page 4, lines 22-29, and page 8, lines 10-11. As discussed above, mixing by agitation in Applicant's invention is important because the fluid in Applicant's methods can become depleted of reactants near the features on the linear array because of binding of molecules to the features of the array. Kellogg does not offer any information relevant to this since Kellogg is concerned only with mixing by diffusion. Accordingly, Kellogg does not anticipate or suggest the method of claim 16 of the present application, and combining the teaching with that of Chee does not cure this lack of teaching on the part of Kellogg. Thus, the combined teachings of the references do not produce the present claimed method of claim 16.

Without acquiescing in the assertion in the Office Action, claims 17 and 18 are patentable over the combined teachings of Kellogg and Chee at least because of their respective dependency ultimately from Claim 16, which is patentable over the reference as indicated above.

Claim 19 is patentable over the combined teachings of the references. The teachings of Kellogg and Chee do not suggest a method wherein a wash fluid is introduced into a housing as defined and intermittent centrifugal force is generated sufficient to cause agitation of the wash fluid.

Without acquiescing in the assertion in the Office Action, claims 20-29 are patentable over the combined teachings of Kellogg and Chee at least because of their respective dependency ultimately from Claim 16, which is patentable over the reference as demonstrated above.

Conclusion

Claims 1-2 and 4-29 satisfy the requirements of 35 U.S.C. §§112, 102 and 103. Allowance of the above-identified patent application, it is submitted, is in order.

Respectfully submitted,

A handwritten signature in cursive script, reading "Theodore J. Lettreg".

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